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Prevalence and Correlates of Injecting with Visitors from the United States Among People Who Inject Drugs in Tijuana, Mexico

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Abstract

Cross-border infectious disease transmission is a concern related to drug tourism from the U.S. to Mexico. We assessed this risk among people who inject drugs (PWID) in Tijuana, Mexico. We measured the prevalence and identified correlates of injecting with PWID visiting from the U.S. among PWID in Tijuana using univariable and multivariable logistic regression. Of 727 participants, 18.5% injected during the past 6 months in Mexico with U.S. PWID described mostly as friends (63%) or acquaintances (26%). Injecting with U.S. PWID was independently associated with higher education [adjusted odds ratio (aOR) = 1.13/year], deportation from the U.S. (aOR = 1.70), younger age at first injection (aOR = 0.96/year), more lifetime overdoses (aOR = 1.08), and, in the past 6 months, backloading (aOR = 4.00), syringe confiscation by the police (aOR = 3.02) and paying for sex (aOR = 2.98; all p-values < 0.05). Nearly one-fifth of PWID in Tijuana recently injected with U.S. PWID, and their reported risk behaviors could facilitate cross-border disease transmission.

Keywords HIV · HCV · Injection drug use · Deportation · Drug tourism

Introduction

Whether in the context of labor migration [1], travel [2–5] or unstable housing, [6–8] population mobility is a recognized risk factor for infectious disease transmission through bridging populations, with mobile individuals being exposed to higher infection prevalence or engaging in higher risk behaviors at their destination vs. place of origin (or the converse). In the context of drug use, differences in drug availability, price, quality or legality between settings has been shown to promote travel among people who inject drugs (PWID) [9]. This is particularly relevant on the U.S.-Mexico border, where spillover drugs from trafficking into the U.S. can increase availability and lower prices of drugs in Mexican border cities. San Diego, CA and Tijuana, Mexico share one of the world's busiest international border crossings [10]. Given high prevalence of HIV and hepatitis C virus (HCV) infection among PWID in Tijuana (3.5% [11] and 96% [12]) and in San Diego (3.2% [13] and 66% [14]), this study investigated infection risk and demographic and behavioral patterns among PWID in Tijuana who have cross-border injecting partners.

Among PWID in Tijuana enrolled in a 2006–2007 study [15], 56% reported ever injecting with PWID from the U.S.

A. Bórquez and R.S. Garfein are co-lead authors who both contributed equally to the conceptualization, data analysis, interpretation of results, manuscript drafting and final approval of this manuscript.

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These participants had higher education, were more likely to speak English, and to have ever spent time in the U.S., been deported from the U.S. or been incarcerated. Exposure to incarceration and law enforcement can exacerbate HIV associated risk behaviors among PWID in Tijuana [16–18]. In this study, injecting risk behaviors and prevalence of HIV, syphilis and tuberculosis infection were not associated with injecting with PWID from the U.S.

Drug use epidemics are shaped by changes in the structural environment. Rhodes's risk environment framework describes how morbidity and mortality associated with drug use are influenced by determinants exogenous to the individual. We assume that changes in drug and immigration policies affecting Mexico and the U.S. influence cross-border injecting patterns and associated risks. Deportation rates through removals (as opposed to voluntary returns) were high during the 2008–2016 U.S. presidential administration [19], which likely increased PWID deportations to Tijuana, potentially facilitating cross-border injecting because U.S. PWID may visit Mexico to inject with deported peers. Additionally, in 2009, Mexico enacted drug law reforms allowing the possession of most drugs in small quantities for personal consumption [20, 21]. Lower legal penalties might have motivated some U.S. PWID to seek drugs in Mexico and affected the nature of cross-border interactions. A cohort study of PWID recruited in San Diego in 2012–2014 found that 18% had injected drugs while in Mexico in the past 6 months; this group shared syringes less often while injecting in Mexico than in the U.S [14]. We hypothesized that injecting in Tijuana with PWID visiting from the U.S. would be associated with deportation, that it would not be associated with HIV risk behaviors and that risk behaviors would decrease when injecting with U.S. PWID.

We used baseline data (2011–2012) from a cohort study of PWID in Tijuana to describe the prevalence of injecting with PWID visiting from the U.S. and identify socio-demographic factors, injecting and sexual behaviors associated with this practice. In addition, we assessed injecting practices and locations specific to times participants injected with PWID from the U.S. while in Mexico and described their relationships. This information is key to estimating the potential for cross-border outbreaks of infectious diseases and inform the design of interventions.

Methods

Participants

We analyzed baseline data from a cohort study of PWID living in Tijuana, described elsewhere [22]. Eligibility criteria included injecting drugs within the past month, age at least 18 years, able to speak Spanish or English, and current Tijuana residency with no plans to move away in the following 2 years.

Data Collection

Participants were recruited in 2011–2012 using convenience sampling. They completed the baseline assessment in Spanish or English administered by trained interviewers using computer assisted personal interviewing technology in a private setting. Upon completing the interview, participants were tested for HIV infection and received pre- and post-test counseling accompanied by referrals for care as needed. Participants received the equivalent of $20 USD for completing the baseline assessment. Written informed consent was obtained prior to completing any study procedures. The University of California San Diego Human Research Protection Program and the Institutional Review Board for Xochicalco University approved the study protocol.

Measures

Study interviews captured information on drug use and sexual behaviors, including information on injecting with PWID visiting from the U.S. Specifically, the outcome variable (injected with a PWID from the U.S. in Mexico in the past 6 months—yes vs. no) was constructed based on the participants' responses to the following question: "In the last 6 months, how many different people who live in the U.S. did you inject drugs with in Mexico?"

Potential correlates were explored based on theoretical subject matter considerations and included socio-demographic characteristics, encounters with law enforcement and injecting and sexual risk behaviors. Variables referred to the past 6 months or lifetime as indicated in Table 1.

Socio-demographic variables included age, sex, educational attainment, income level and main source of income, as well as exposures to the U.S. and Mexico, assessed as country of birth (Mexico vs. other), number of years lived in Tijuana, languages spoken, and history of deportation from the U.S. Law enforcement variables included history of arrest and incarceration, syringe confiscation and harassment by the police. Injection risk included age at first injection, duration of injecting, frequency of injecting, types of drugs injected, borrowing (i.e. receptive sharing) and lending (i.e. distributive sharing) used syringes for injecting, and sharing other injection paraphernalia. We also assessed access to sterile syringes, drug overdose history, and treatment for alcohol or drug use. Sexual risks included having a regular partner and condom use with this partner, number of casual partners, engagement in selling or buying sex, having had sex with an HIV-positive partner and having had sex in the U.S.

Table 1 Descriptive statistics and univariable associations between sociodemographic, behavioral and law enforcement factors and injection drug use in the past 6 months in Mexico with people visiting from the United States

Variables	Injected in Mexico with U.S. PWID		Odds ratio	95% confidence interval	p-value
	Yes (n = 132)	No (n = 595)			
Socio-demographic characteristics					
Age, mean (SD)	38.3 (10.0)	37.2 (8.7)	1.01	(0.99, 1.04)	0.280
Male gender (reference: female), N (%)	89 (67.4)	364 (61.2)	1.31	(0.88, 1.96)	0.181
Country of birth: Mexico vs. other, N (%)	118 (89.4)	558 (93.8)	0.56	(0.29, 1.07)	0.078
Lived in Tijuana entire life[a], N (%)	**26 (19.7)**	**168 (28.2)**	**0.62**	**(0.39, 0.99)**	**0.046**
Number of years lived in Tijuana, mean (SD)	**19.5 (14.2)**	**23.3 (14.0)**	**0.98**	**(0.97, 0.99)**	**0.008**
Ever lived in the U.S., N (%)	**103 (24.0)**	**29 (9.8)**	**2.91**	**(1.87, 4.53)**	**< 0.001**
Able to speak English, N (%)[a]	**97 (73.5)**	**250 (42.0)**	**3.82**	**(2.51, 5.82)**	**< 0.001**
Ever deported from the U.S., N (%)[a]	**70 (53.0)**	**227 (38.2)**	**1.83**	**(1.25, 2.68)**	**0.002**
Moved to Tijuana due to deportation from the U.S., N (%)[a]	**45 (34.4)**	**119 (20.0)**	**2.09**	**(1.38, 3.16)**	**< 0.001**
Number of years of education, mean (SD)	**8.6 (3.3)**	**7.6 (3.2)**	**1.11**	**(1.05, 1.19)**	**< 0.001**
Average monthly income: ≥ 2500 pesos vs. < 2500 pesos, N (%)	**90 (68.2)**	**268 (45.3)**	**2.58**	**(1.73, 3.85)**	**< 0.001**
Principal source of income: selling drugs, N (%)	3 (2.3)	3 (0.5)	4.59	(0.92, 23.00)	0.064
Principal source of income: prostitution/sex work, N (%)	27 (20.5)	112 (18.8)	1.11	(0.69, 1.77)	0.666
Tested positive for HIV (at baseline)[a], N (%)	5 (3.8)	21 (3.5)	1.08	(0.40, 2.91)	0.885
Injecting risk					
Age when first injected, mean (SD)	**19.5 (5.8)**	**21.3 (6.8)**	**0.95**	**(0.92, 0.99)**	**0.006**
Duration (years) of injection, mean (SD)	**18.7 (10.6)**	**15.9 (9.4)**	**1.03**	**(1.01, 1.05)**	**0.004**
First injected in Mexico[a], N (%)	**81 (61.4)**	**448 (75.3)**	**0.52**	**(0.35, 0.77)**	**0.001**
Injected ≥ once per day, N (%)*[a]	125 (94.7)	564 (95.1)	0.92	(0.39, 2.14)	0.844
Injected heroin, N (%)*[a]	126 (95.5)	567 (95.3)	1.04	(0.42, 2.56)	0.937
Injected cocaine, N (%)*[a]	**18 (13.6)**	**37 (6.2)**	**2.38**	**(1.31, 4.32)**	**0.005**
Injected methamphetamine, N (%)*[a]	**56 (42.4)**	**150 (25.3)**	**2.18**	**(1.47, 3.23)**	**< 0.001**
Any distributive needle sharing, N (%)*[a]	**116 (87.9)**	**410 (68.9)**	**3.27**	**(1.89, 5.67)**	**< 0.001**
Any receptive needle sharing, N (%)*[a]	**119 (90.2)**	**400 (67.2)**	**4.46**	**(2.46, 8.11)**	**< 0.001**
Divided drugs with someone else by using a syringe (backloading), N (%)*[a]	**111 (84.7)**	**328 (55.2)**	**4.50**	**(2.72, 7.44)**	**< 0.001**
Used a cooker/cotton/water with or after someone else, N (%)*[a]	**112 (85.5)**	**373 (62.8)**	**3.49**	**(2.09, 5.84)**	**< 0.001**
Got syringes to inject drugs most often from pharmacist, N (%)*[a]	**44 (33.3)**	**257 (43.2)**	**0.66**	**(0.44, 0.98)**	**0.038**
Found it hard to get new, unused syringes for injecting drugs, N (%)*[a]	**36 (27.3)**	**98 (16.5)**	**1.90**	**(1.22, 2.95)**	**0.004**
Got syringes from a syringe exchange program, N (%)*[a]	**18 (13.6)**	**40 (6.7)**	**2.19**	**(1.21, 3.96)**	**0.009**
Number of times overdosed ever, mean (SD)	**2.3 (2.7)**	**1.6 (2.5)**	**1.10**	**(1.03, 1.17)**	**0.003**
Ever received professional help for drug or alcohol use[a], N (%)	83 (62.9)	330 (55.5)	1.36	(0.92, 2.01)	0.120
Sexual risk					
Sexual orientation: heterosexual vs. homosexual/bisexual/other, N (%)	117 (88.6)	557 (93.6)	0.53	(0.28, 1.00)	0.050
Had a regular sex partner, N (%)*[a]	**85 (64.4)**	**305 (51.3)**	**1.71**	**(1.16, 2.53)**	**0.007**
Never used a condom with regular partner, N (%)*[a]	**72 (54.5)**	**240 (40.5)**	**1.76**	**(1.21, 2.58)**	**0.003**
Number of casual sex partners, mean (SD)*	8.4 (45.5)	3.9 (16.6)	1.01	(1.00, 1.01)	0.055
Received money/goods/etc in exchange for sex, N (%)*[a]	49 (37.1)	173 (29.4)	1.42	(0.96, 2.11)	0.082
Gave money/goods/etc in exchange for sex, N (%)*[a]	**24 (18.2)**	**37 (6.2)**	**3.35**	**(1.92, 5.82)**	**< 0.001**
Ever had sex with HIV infected person, N (%)[a]	7 (5.3)	13 (2.2)	2.50	(0.98, 6.40)	0.055
Had sex in the US (past year), N (%)[a]	**18 (13.6)**	**19 (3.2)**	**4.77**	**(2.43, 9.37)**	**< 0.001**
Encounters with law enforcement					
Arrested, N (%)*[a]	71 (54.2)	299 (50.3)	1.17	(0.80, 1.71)	0.414
Number of times arrested, mean (SD)*	**6.9 (20.4)**	**3.8 (8.6)**	**1.02**	**(1.01, 1.03)**	**0.005**
Spent time in jail, N (%)*[a]	**65 (49.2)**	**214 (36.0)**	**1.73**	**(1.18, 2.53)**	**0.005**
Had syringes confiscated by police without arrest, N (%)*[a]	**28 (21.2)**	**54 (9.1)**	**2.70**	**(1.63, 4.46)**	**< 0.001**
Harassed by police, N (%)*[a]	**105 (79.5)**	**383 (64.4)**	**2.15**	**(1.37, 3.39)**	**0.001**

*Reference period was the past 6 months, bold: significant at p = 0.05 level, odds ratios are from univariable logistic models fitted via GEE

[a]Yes vs. no

We conducted descriptive analyses of variables characterizing injecting behaviors specific to times they injected with U.S. PWID in Mexico and defining their relationships with those U.S. PWID based on the following questions: "The next questions refer to the people who live in the U.S. that you injected drugs with in the past 6 months in Mexico. What was your relationship to these people?" and "Where did you meet these people?" (see Table 3 for response options).

Statistical Analyses

Among 734 cohort participants, 727 (99%) had responses for the dependent variable and were included in this analysis. We calculated baseline descriptive statistics for sociodemographic and behavioral factors among participants in our two outcome groups (i.e., those who did and did not inject in Tijuana with PWID visiting from the U.S. within the past 6 months). We presented frequencies and proportions for binary factors and means and standard deviations for continuous factors (Table 1).

Univariable and multivariable logistic regression models with empirical standard error estimation via generalized estimating equations (GEE) were used to identify factors associated with injecting drugs with PWID visiting from the U.S. in Mexico [23, 24]. GEE is commonly used to estimate parameters for a wide variety of generalized linear models (including logistic regression) when correlation between observations might be present. Since our data was collected via convenience sampling (as opposed to random or other type of probability sampling), some observations may be correlated and use of GEE to obtain robust standard errors is warranted. Population averaged estimates for odds ratios along with corresponding 95% confidence intervals and p-values yielded by the univariable GEE analyses are presented in Table 1. Variables that yielded $p \leq 0.10$ in univariable models were considered for inclusion in multivariable models, based on the acceptable cut-off range [25, 26]. To create the final multivariable model, we used a "purposeful selection of variables" approach [27, 28] guided by subject matter significance, relationships among potential correlates (e.g., correlations, confounding, and interactions) and statistical significance. Multi-collinearity was assessed and was ruled out by appropriate values of the variance inflation factors and condition indexes. All two-way interactions between the main correlates were also assessed. A liberal $p \leq 0.10$ significance level was used and the interaction significant at this level was evaluated by calculating the corresponding simple main effects. In the multivariable model, with the exception of interaction terms, $p \leq 0.05$ was interpreted as being statistically significant and $0.05 < p \leq 0.10$ was interpreted as being borderline significant. All statistical analyses were conducted using SAS, version 9.4.

Results

Among 727 PWID in Tijuana, mean age was 37.4 (range 18–63) years; 62% were men; 93% were born in Mexico; and 50% could speak English (Table 1). Overall, 132 (18.5%) had injected in Mexico with a PWID visiting from the U.S. during the past 6 months.

Univariable Analysis of Factors by Injecting with PWID Visiting from the U.S.

Odds of injecting with U.S. PWID were lower among those born in Mexico or having lived their entire lives in Tijuana (Table 1). Odds were higher among those who could speak English, were deported from the U.S., had moved to Tijuana because of U.S. deportation and had higher education and annual income. HIV prevalence was 3.6% overall and did not differ between the groups. All those who tested HIV-positive were previously unaware of their positive sero-status, and thus, were not receiving treatment.

Regarding injection risk, odds of injecting with U.S. PWID were lower among those who initiated injecting in Mexico and higher among those who injected heroin and either cocaine or methamphetamine (polydrug use), engaged in receptive and distributive syringe sharing, divided drugs with a used syringe, shared other injection paraphernalia, reported difficulty obtaining unused syringes for injecting in the past 6 months and those who experienced more lifetime overdoses.

Regarding sexual behavior, odds of injecting with U.S. PWID were higher among those having a regular partner and reporting never using condoms with that partner in the past 6 months, among those having bought sex and those having had sex in the U.S. in the past 6 months; but lower among those identifying as heterosexual. Having a higher number of casual partners and sex with an HIV-positive partner had a borderline significant association with injecting with U.S. PWID.

In terms of law enforcement exposure, participants with more arrests and times spent in jail in the past 6 months had higher odds of injecting with U.S. PWID, as well as those who had syringes confiscated by the police without being arrested and those harassed by the police.

Multivariable Analysis of Factors by Injecting with PWID Visiting from the U.S.

Injecting with PWID from the U.S. was independently associated with higher education [adjusted odds ratio (aOR) = 1.13 per year, $p = 0.001$], having moved to Tijuana because of deportation from the U.S. (aOR = 1.70, $p = 0.02$),

younger age at first injection (aOR = 0.96 per year, p = 0.03), dividing drugs with someone else with a used syringe in the past 6 months (aOR = 4.00, p < 0.001), more lifetime overdose events (aOR = 1.08 per event, p = 0.05), having syringes confiscated by the police without being arrested in the past 6 months (aOR = 3.02, p < 0.001) and giving money or other commodities in exchange for sex in the past 6 months (aOR = 2.98, p < 0.001; Table 2).

A borderline significant (p = 0.09) two-way interaction showed that men, but not women, had higher odds of injecting with PWID from the U.S. if they had given money or other commodities in exchange for sex. All variables in Table 2 remained significant in a model that included the interaction term.

Relationship and Behaviors with PWID from the U.S.

PWID from the U.S. were characterized by participants as friends (63%), acquaintances (26%), strangers (7%) or sex trade clients (5%). They mostly reported meeting U.S. PWID in outside locations (47%) or at their or someone else's home (23%) (Table 3). During injecting events with PWID from the U.S., most reported distributive (67%) or receptive (62%) syringe sharing and sharing other injection paraphernalia (70%) in the past 6 months (Table 3); however, prevalence of any distributive and receptive syringe sharing among PWID who injected with U.S. PWID was higher overall (88% and 90%, respectively, in the past 6 months) than while injecting with U.S. PWID (Table 1).

Discussion

Nearly one-fifth of PWID who reside in Tijuana reported injecting with PWID visiting from the U.S. in the past 6 months. While previous studies investigated injecting drug use with U.S. PWID among Tijuana PWID, this is the first to characterize these interactions in a defined time period (i.e. past 6 months) and location (i.e. in Mexico). As found by Wagner et al., compared to PWID who did not inject with U.S. PWID, those who did were more likely to be male, more educated and to have been deported from the U.S. However, contrary to previous findings, they were also more likely to report HIV-associated risk factors including backloading drugs for injection, higher numbers of overdoses, paying for sex, and having syringes confiscated by the

Table 3 Characteristics of injecting events with PWID from the United States among participants who reported injecting in the past 6 months in Mexico with people visiting from the United States

Variable	Percent
Injecting risk past 6 months (yes vs. no) (N = 132)	
Any distributive needle sharing	67
Any receptive needle sharing	62
Ever used a cooker/cotton/water with or after someone else	70
*Participant's relationship with PWID from the U.S.: (N = 132)**	
Family member	3
Friend	63
Sex partner (not from sex trade)	3
Client (paying partner)	5
Acquaintance	26
Stranger	7
Other	2
*Place (s) participant met PWID from the U.S.: (N = 132)**	
Home	11
Someone else's home	12
Shooting gallery	11
Outside location (construction site, alleyway, on the street, vacant lot, park, freeway overpass/bridge, canal)	47
Bar/club	12
Brothel/strip club	1
Public restroom	0
Other	19

PWID people who inject drugs

*Participants could check multiple responses

Table 2 Factors independently associated with injection drug use in the past 6 months in Mexico with people visiting from the United States

Variable	Adjusted odds ratio	95% confidence interval		p-value
Age at first injection (per year)	0.96	0.93	0.99	0.027
Male gender (reference: female)	1.21	0.77	1.90	0.414
Number of years of education (per year)	1.13	1.05	1.21	0.001
Moved to Tijuana due to deportation from the U.S.	1.70	1.08	2.68	0.022
Divided drugs with someone else by using a syringe (backloading)*	4.00	2.33	6.88	< 0.001
Had syringes confiscated by police without being arrested*	3.02	1.73	5.28	< 0.001
Number of times overdosed in lifetime (per event)	1.08	1.00	1.18	0.049
Gave money/goods/etc. in exchange for sex*	2.98	1.69	5.24	< 0.001

*Reference period was the past 6 months. Adjusted odds ratios are from multivariable logistic models fitted via GEE

police. This study also contributes new information regarding the nature of relationships between PWID from Tijuana and San Diego and their injecting risk behaviors during these interactions. U.S. visitors with whom they injected were mainly considered friends and acquaintances, but some were strangers or sex trade clients and rates of distributive and receptive syringe sharing with U.S. PWID were high.

Being deported from the U.S. and higher education were independently associated with injecting with U.S. PWID. In bivariate analyses, speaking English (which was correlated with education) and having started injecting in the U.S. were also associated with injecting with U.S. PWID. These are all potential indicators of having stronger links to the U.S. facilitating relationships with PWID visiting from the U.S. Quantitative and qualitative studies among PWID in Tijuana showed associations between deportation and high risk drug using behaviors, including trying new drugs [29] and greater syringe sharing [30].

The high prevalence of syringe sharing during encounters with U.S. PWID is worrying as it suggests potential for cross-border disease transmission. Reported prevalence of syringe sharing was higher than those reported in the parallel study in San Diego [14] among U.S. PWID who injected in Mexico (62% vs 35% for receptive syringe sharing), although differences in study design could account for some variation. Nonetheless, as was found among PWID in San Diego, fewer injecting risk behaviors were reported when injecting with someone visiting from the U.S. compared to their behaviors overall, suggesting safer injecting practices during these encounters. It is possible that PWID from the U.S. perceive higher risk when injecting in Mexico and practice safer injecting, leading to lower risk behaviors among PWID in Tijuana. If true, this finding suggests that PWID can reduce their risk in specific circumstances and supports the potential for change through peer-based network-based interventions. Indeed, the majority of U.S. PWID were considered friends, although one-third were acquaintances, strangers or sex trade clients suggesting that the HIV/HCV infection status of many injection partners from the U.S. was unknown. Education and prevention messages among PWID in the U.S. about the increased risk of exposure to HIV and HCV in Tijuana resulting from the lower access to HIV [31, 32] and harm reduction [33, 34] services could motivate them to further protect themselves and PWID in Tijuana. Qualitative research regarding these relationships and the motivations and circumstances of these encounters would inform the design of interventions.

PWID who paid for sex in the past 6 months were more likely to have injected with PWID visiting from the U.S. in the same period. Female sex workers in Tijuana have elevated prevalence of HIV (4.8%), active syphilis (11.8%) and chlamydia infection (17%) [35]. In bivariate analyses, unprotected sex with a regular partner, sex with someone while in the U.S. and homosexual orientation were significantly associated with injecting with U.S. PWID. These findings suggest that PWID in Tijuana who inject with U.S. PWID could bridge multiple groups at increased risk for sexual and bloodborne infections.

Having syringes confiscated by the police without being arrested in the past 6 months was also independently associated with injecting with U.S. PWID. In bivariate analyses, this group also had a higher arrest frequency and higher exposure to police harassment and incarceration, which are associated with greater injecting and sexual behaviors among this population [16–18, 36]. Higher law enforcement exposure might be due to injecting in public spaces more often, which prior studies have shown to be associated with high injecting risk profiles [37, 38]. Indeed, PWID reported mostly injecting with U.S. PWID in outside locations, including in the streets and in the Tijuana river canal, where many deported PWID congregate. This suggests mobile, street-based interventions may be most effective at preventing risk during cross-border encounters.

Importantly, overdose was prevalent among PWID who injected with U.S. PWID, although the association was borderline significant. This is consistent with the higher risk profile exhibited by this group, including engagement in polydrug use, and emphasizes the need to prioritize this population with harm reduction services, including naloxone.

Limitations

This study relied on self-reported behaviors that are subject to problems with recall, lack of precision and socially desirable responding. To minimize these problems, the survey was administered by highly trained interviewers skilled at eliciting accurate responses by establishing respectful, non-judgemental rapport. Some participants might not have known that their injection partners were from the U.S.; therefore, our findings could underestimate the prevalence of injecting with PWID visiting from the U.S. This study involved a cross-sectional analysis of baseline data, which precludes drawing causal inferences. Further, this sample of PWID might not be representative of all PWID in Tijuana given the hidden nature of this population.

Conclusions

Our study supports prior research showing that ‘drug tourism’ among U.S. PWID in the border region is common. A history of deportation was independently associated with injecting with PWID from the U.S.; thus, our findings challenge U.S. federal government proposals to increase deportation, because such policies could paradoxically contribute to

HIV and HCV transmission. Indeed, deportation and cross-border injecting were associated with a range of high risk behaviors and exposures that could facilitate cross-border disease transmission. However, our study also found that PWID in Tijuana reduced their HIV risk behaviors during encounters with U.S. PWID, suggesting that unilateral and/or binational interventions could reduce risk on both sides of the border.

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